

ENVIRONMENTAL ASSESSMENT STATEMENT

CONSTRUCTION OF NEW 210 MGD
WATER POLLUTION CONTROL PLANT

AT THE

SOUTHWEST WATER POLLUTION CONTROL FACILITY

80TH & PENROSE AVES.

PHILADELPHIA, PENNSYLVANIA

A REPORT TO THE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

PREPARED BY

CITY OF PHILADELPHIA - WATER DEPARTMENT

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I. BRIEF BACKGROUND

The project service area of this regional facility has been well defined for the immediate future and for the design year of 1990 (1,10). It is being constructed as a result of specific orders of the Delaware River Basin Commission and the (then) Sanitary Water Board of the Commonwealth of Pennsylvania (9). These orders are based on the "Delaware Estuary Comprehensive Study" (3) performed by the federal government in the 1960's. The DECS work developed a steady state, one-dimensional mathematical model which allegedly could predict dissolved oxygen (water quality) levels given various waste loads as inputs. The Water Department challenged the orders of DRBC and the Commonwealth on the basis that the DECS model was not technically sound (7,8,15). This contention has been supported by others (4,5). In spite of the testimony challenging the model, the Water Department acquiesced to build facilities to meet the intent of the orders in March, 1970.

The only existing basin wide plan for water quality is the Delaware River Basin Commission's Comprehensive Plan (2). However, in accordance with federal legislation (18CFR601), the Commonwealth of Pennsylvania is developing a state wide Water Quality Management Plan which will include the Lower Delaware River Basin in the Philadelphia area. The DRBC is also considering a specific Water Quality Management Plan.

Present and future (1990) wastewater treatment needs including regionalization will be satisfied by the project (1). If, however, treatment removal requirements (9) are increased, it may be necessary to construct additional facilities. This is provided for in the plant design (1) and also by acquisition of adequate land (see Section C-"Land").

Physical resources constraints are limited primarily to funding. It would be impossible to construct the required facilities without federal and state aid. This tight fiscal situation is further compounded by a compressed construction schedule which may necessitate contractors working a second shift. This practice inflates the cost of the facility without an increase in benefits to be derived from the project.

Since the facilities to be constructed are practically fixed by virtue of the nature of the orders (9), and because of the doubts expressed (4,5,7,8) that the water quality alleged by DRBC (2,6,9) will be realized, any resources committed to the project over and above conventional secondary treatment may not be justifiable. However, amortization of the City's bonds required for this project will have to be borne by the citizens of Philadelphia, whether or not the water quality of the Delaware River improves to predicted (6) levels.

II. SUMMARY OF ALTERNATIVE PROJECT SOLUTIONS

Once orders were issued (9), the City of Philadelphia had three alternative solutions:

1. Take no action (but be subject to regulatory reprisals and legal action)
2. Point out the technical deficiencies of the DECS model to DRBC and the Commonwealth of Pennsylvania and modify the orders.
3. Build facilities to meet the intent of the orders

Alternative I was not considered initially since the Water Department had supported DECS Objective Set III (3) which essentially called for all dischargers to go to conventional secondary treatment. Plans to upgrade all of Philadelphia's plants to this level appeared in the Philadelphia Capital Program prior to the orders issued by DRBC and Pennsylvania.

Alternative II was explored in public hearings (7,8). The result of such hearings was a legal (no technical fact-finding) adjudication against the City's appeal and the orders were upheld. Meetings were held with all concerned parties and in March 1970, the City acquiesced to pursue alternative III.

Alternative I would not have occasioned any capital expenditure. However, operating costs would have increased periodically as a result of salary increases and increases in the cost of materials and supplies.

Since Alternative II never came to fruition, no associated costs have been developed. The costs, both capital and operating, are defined in the PL-660 application for the project. Summarizing:

Estimated SWWPCP Costs

Phase I Construction	-	\$84,825,000 (capital)
Operating/Annum	-	\$ 2,980,000

The capital cost does not include the amortization of the City's 30-year bonds. This cost cannot be estimated at this time since the extent of federal and state funding (PL-660, Part "A") is still pending.

The completion date for this project is currently December 31, 1975, as a result of compression of the original construction schedule by EPA.

III. DETAILED ENVIRONMENTAL EVALUATION OF EACH FEASIBLE ALTERNATIVE

Since alternatives I and II are not feasible solutions by virtue of the orders (9), no evaluation has been made by the Water Department. DECS did approximate the cost of Alternative I, on a basin wide scale, at \$30,000,000 (3) (However, this is in 1964 dollars and the estimates rate the cost of capital at an unrealistic 3%. Operating and maintenance were underestimated as a result of using the Sinking Fund Method which municipalities do not employ). Therefore, only Alternative III will be considered under this section.

A. & B. Responses to III A and B may be found under the discussion of natural resources which follows. Design decisions relative to the selection of specific unit treatment processes are well documented (1).

C. According to the Delaware River Basin Commission, completion of the project will result in improved water quality in the Delaware River (2,6,9). Philadelphia and others, however, have expressed serious doubts (4,5,7,8,15) about the level of improvement. The orders further require chlorination of the final effluent which may have an adverse effect upon the aquatic population of the Delaware River (26), particularly in view of the fact that this requirement pertains to all municipal dischargers in the Estuary. The DRBC and Pa-DER have never made an environmental assessment of the effects of the regulation on chlorination.

Not all bodies of water should be designated for water contact recreation (swimming, water skiing, etc.). This is particularly true of the Delaware Estuary since it is a major port and pier facility and the undercurrents and wakes generated by ocean going vessels present an extreme hazard to swimmers even if the water quality would permit swimming. There are no areas along the Philadelphia stretch of the river which would permit development of beaches. These facts have been detailed previously (7). There would be no realizable benefits for the substantial additional cost.

Similarly, a hypothesized increase of 10% in fish passage does not justify the difference in cost (3). (The DECS work is cited here only for cost comparison between Objective Sets II and III, since the actual costs were grossly underestimated as explained previously.)

All Philadelphians will be paying for this project and other similar projects (upgrading and expansion of the existing Southeast and Northeast Plants and the construction of a new Northeast Plant) for the next 30 years (bonding amortization period) when at best, assuming the DRBC Water Quality Standards (6) are attained, it is questionable as to whether or not

Philadelphia's citizens will benefit.

D. The largest irreversible and irretrievable commitment of resources to the projects entails the expenditure of vast sums of money for the construction of facilities and the resultant additional operating costs.

If the concern expressed by Philadelphia and others (4,5,7,8,15) that the water quality of the Delaware River will not improve to the degree alleged (2,6,9), those resources committed to the project over and above the construction of conventional secondary treatment facilities will, in fact, be irreversible and irretrievable.

IV. COMPARISON OF ALTERNATIVES AND SELECTION OF PROPOSED PROJECT

Since the City of Philadelphia is required to meet the DRBC Water Quality Standards (6) by virtue of legally binding orders (9), the construction of the project as previously described (1) is the only alternative and, consequently, the only available solution.

Ecological factors have been delineated elsewhere in this report (see III, A, B, & C and "Natural Resources" Section).

As expressed earlier, the Philadelphia Water Department does not feel that the construction of more than conventional secondary facilities is justifiable from either a social or economic viewpoint.

Priorities for pollution abatement should be established based on local needs. Philadelphia has other urgent needs which should be considered in the context of environmental improvement. These include such areas as better housing, crime prevention, mass transit, better schools, reduction of unemployment, elimination of urban blight, etc. Only when all of these needs are identified as environmental problems and realistically addressed can the relationship of any individual pollution abatement project to the total environment of the community be resolved.

PUBLIC PARTICIPATION

1. The Public was involved in the formulation of water quality standards during the DECS investigation (3; pg iii) and throughout the formulation of standards by DRBC as required by the DRBC Administrative Manual, Part II, "Rules of Practice and Procedures" (24; Section 2-3.10). On December 12, 1972, the DRBC held a public hearing to approve the Southwest Treatment Plant (Docket D-70-53 CP) as part of its Comprehensive Plan.

The DVRPC requires a public hearing to adopt or amend any of its regional plans. This project is an approved regional facility (10) and hence was subject to public hearing.

As part of the application process for federal funds, this project was processed through the "Project Notification Review System" (OMB Circular A-95-revised; see PL-660 application).

2. No environmental controversies have arisen to date with the exception of the City of Philadelphia's objection to the orders of DRBC and Pa-DEP (9) which are based on a technically unsound mathematical model (4,5,7,8,15). Efforts to resolve this issue have not been successful and the orders (9) remain in force. Final resolution will rest with whether or not the alleged improvement in the level of water quality of the Delaware River will be realized when all dischargers are in compliance with DRBC and state orders.

NATURAL RESOURCES

A. Water

1. The project as described in the "Report on Design Studies" conforms to the Delaware River Basin Commission's Comprehensive Plan for meeting water quality standards in that:

- a. It was designed to produce an effluent which will meet the DRBC Water Quality Standards (1,6)

- b. It was approved by the DRBC at the December 12, 1972 Commission Meeting for inclusion in the DRBC Comprehensive Plan.
 - c. It is shown as a regional facility on the approved DVRPC Regional Water Pollution Control Plan (10).
 - d. A construction permit for the facility is imminent from Pa-DER.
 - e. The facility satisfies the orders (9) of Pa-DER and the DRBC,
2. The Federal Government studied the Delaware Estuary in the 1960's and published their findings (3) in this preliminary report (the final report is still pending). A one dimensional steady state mathematical model was developed which allegedly permits prediction of dissolved oxygen levels when various waste loadings are in-putted. The DRBC utilized the work of DECS to develop water quality standards (6) which would protect various water uses (6, pg 11-9, section 2-3.3). Subsequently, orders to reduce the waste loadings of each discharger were issued. When such waste loads are reduced, the Delaware River will purportedly improve to a level defined by the DRBC Water Quality Standards.

The Philadelphia Water Dept. objected to the orders to upgrade facilities on the basis that the model developed by DECS and utilized by DRBC was not technically sound. These objections were made known at public hearings (7,8).

The consulting firm of Water Resources Engineers Incorporated was retained to investigate the utility of the DECS model in promulgating water quality standards and hence waste load allocations and orders. The report of WRE supports the contentions of the Philadelphia Water Dept. relative to the DECS model (4, pg 8-13).

Another independent review of DECS was undertaken at the University of Pennsylvania (5). Again Philadelphia's contentions were upheld.

The orders (9) further require chlorination of the final effluent. Since chlorine is toxic to all forms of aquatic life, the effect on the receiving stream could be detrimental in this regard (26). Philadelphia objected to chlorination at public hearings (7), but was ordered to provide such facilities (9).

3. Does not apply
4. The City of Philadelphia has an adequate supply of water through the year 2020 under its current allocations (20) not only to supply the City proper, but also surrounding communities. Since the Water Quality Standards of DRBC are based on a flow in the Delaware of 3000 cfs at Trenton, N.J., there should be no effect on the Delaware as a result of Philadelphia's withdrawal.
5. Does not apply
6. The project will not increase downstream flows appreciably. The total plant design flow (210 MGD) is only 2.9% of the average annual Delaware River flow (21, pg 59) and the vast majority of the plant flow is generated from utilizing the Delaware as a source of supply.

STORMWATER OVERFLOWS

The matter of stormwater overflows and their impact on the Delaware River was considered by DECS (3). However, a steady state one-dimensional mathematical model cannot assess such effects except by gross approximation. By definition, steady state excludes flow variation which occurs at times of rainfall and hence the benefits of dilution are not recognized. Such a model cannot handle spiked inputs from storms and therefore can only crudely approximate overflows by imposing a hypothetical daily load.

Until recently, only combined sewer overflows were considered to cause pollution and FWPCA explored the cost of separation (17). Alternatives to separation were considered by Philadelphia since separation was economically unfeasible (16).

Recently, storm discharges from separate systems have been found to be a source of pollution of approximate equal magnitude as that of combined sewer overflows (18). This was pointed out earlier by Philadelphia (16).

Since the polluttional load from storm overflows only constitutes 3-5% of the annual municipal load (18) it appears that priority should be devoted to treatment plants since the greatest percentage reduction of pollution per dollar is inherent in such facilities.

Philadelphia has retained consultants to define the quantity and quality of overflows from combined and separate storm sewers. Reports of these studies are pending. However, the effects of Philadelphia's storm overflows on the Delaware River cannot be isolated from the effects of overflows from other municipalities, overland flow, agricultural runoff, etc., and hence the problem definition is beyond the purview of the City of Philadelphia. It would appear that this would rightfully be under the jurisdiction of DRBC, the neighboring states and the Federal Government since the Delaware is an interstate, navigable water course.

In any event, the effects of storm overflows cannot be adequately assessed until a time-varying, 2-dimensional mathematical model of the Delaware River is constructed. However, input into such a model is dependent upon the innovation of sampling devices and the development of a sampling network. No historical information is available for this purpose.

B. Air

1. Does Not Apply

2. Presently the Water Dept. has a permit from the Philadelphia Department of Public Health to burn grease at the Southwest Plant. This

is in accordance with the City of Philadelphia Standards (25). Any future burning of matter (other than sludge which will not be incinerated) will conform to emission standards and as such should not affect nearby residences and businesses regardless of prevailing wind patterns.

3. No odors are anticipated from the operation of the project because of the nature of the design (1) and construction of these facilities.

C. Land

1. The City of Philadelphia proper should not increase in population to any appreciable degree during the life of the project. In fact, the actual population of Philadelphia decreased during the decade 1960 to 1970. However, there will be cyclical variations in population due to changing birth and death rates even though the total population remains relatively static over a long period of time. If major growth occurs as a result of the project, it would have to occur in those service areas contiguous to Philadelphia. Treatment capacity for such growth has been designed into the project (1).

Service agreements between the City and surrounding communities limit the volume of flow which can enter the Philadelphia system. Such agreements in effect control suburban interceptor systems which connect to the City.

2. The service areas of the project conform to the DVRPC Regional Water Pollution Control Plan (10). Growth in these areas is regulated by the DVRPC land use and open space plans (13,14). These plans have synthesized local plans and as such reflect local growth trends.

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The DVRPC cannot approve any project (e.g. interceptors and sewers) which does not conform to its established plans with regard to open space and land use. Since few, if any, municipalities can afford to build such facilities without federal and state funds and because no federal funds can be awarded to projects without DVRPC approval, the threat of unwanted and uncontrolled growth patterns is minimal.

3. The City of Philadelphia owns the site on which the project will be constructed (1, fig. 18). Since vegetal growth in the area is mostly limited to grass, no effect on land-based ecosystems is envisioned.
4. Landscaping and beautification are inherent in the project and will be incorporated into the final renovation of the existing facility (1). The Philadelphia Art Commission works closely with the Water Department in this respect to insure that our facilities, while functional, are aesthetically sound as well as practicable. Extensive soil studies and borings were made to insure that: construction on the site was practical; the proper substructures would be designed and the geologic formations in the area would not be damaged (22).
5. The site of the existing Southwest Treatment Plant encompasses some 358 acres (1; scaled from fig. 18). The new facility will occupy approximately 40 acres (1; scaled from fig. 18). A complete soils study was performed and soil types and conditions delineated (22).
6. Since the City of Philadelphia owns the 358 acre site and because ample room for the new facility exists at the present site, other possible locations were not given consideration. Additional reasons for this decision are:

- a. Building on the existing site gives the total facility (new and old) the greatest treatment flexibility.
- b. The orders (9) initiating construction were to upgrade existing facilities.
- c. Existing interceptors can be utilized at the present site, thereby negating the necessity for additional interceptor construction.
- d. The adverse environmental effects at the existing site are minimal (22) and land based ecosystems are unaffected here while they might be at other locations.
- e. It is dubious that other suitable sites in the City of Philadelphia exist. Even if other sites were available, the acquisition would be time consuming, costly (land and new interceptors, etc.) and delay construction of the required facilities.
- f. As described in the answer to question 5 above, ample land exists by virtue of owning more land than is required by the project. Expansion area is available for the future (1, fig.18).

HUMAN EFFECTS

A. Social and Economic

1. The project will not result in the relocation of people.
2. As a result of the project, water quality of the Delaware River will allegedly be improved (2,3,6,9).
3. Does not Apply
4. Does not Apply

5. As discussed under Section C, "Land", questions 1 and 2, growth of the service area is most likely to occur outside the city (1,10,11,12,13,14) and can be regulated as discussed above.
6. This project will not result of propagation of insects and as such no health hazards or nuisances are anticipated. No such problem exists at the present time and with the removal of sludge lagoons as part of the project, the possibility of insect problems is further negated.
7. Noise is primarily caused by the operation of equipment (pumps, blowers, etc.) and since such equipment is enclosed in structures (1, figs.1 to 39) no noise problems are anticipated as a result of the project. Such structures are not proximate to any residences in the area.

B. Aesthetics

1. Does Not Apply
2. The Philadelphia Water Department and its consultant, Greeley and Hansen Engineers, are employing architects in the design of facilities to insure that the facilities constructed are aesthetically sound and blend in with existing structures. Landscaping is done for all Water Department facilities and is reviewed with the Philadelphia Art Commission as described in section C, "Land", Question 4. As a further aesthetic safeguard, all plans and specifications (including architecture and landscaping) are reviewed by EPA under PL-660, Part "B".

CONSTRUCTION

1. Since the site will be landscaped as part of construction at the Southwest Plant (1), it stands to reason that every precaution will be taken to minimize vegetal disruption during construction of the project (1; fig. 18).

2. .Blasting or burning is not anticipated at the present time relative to this project. However, all construction is done under Standard City of Philadelphia Requirements (19). In addition, special specifications are developed for each individual project to minimize the effect of construction on the environment.
3. Erosion control is required by paragraph 54, of the City of Philadelphia Standard Contract Requirements for Public Works (19). In addition, sedimentation of streams is prohibited by Section "204, paragraph a" of the Clean Streams Law of Pennsylvania (23). Again EPA can review all specifications prior to award under PL-660, Part "B".
4. Does Not Apply - No Residences in the area.
5. No adverse effect on the wildlife and aquatic life as a result of construction of the project is envisioned since the vast majority of construction is land-based and the site is not inhabited by wildlife. The only construction that could possibly affect the aquatic life in the Delaware River will be the construction of the final effluent conduit. Specifications for this conduit construction will be developed in accordance with Section 204, paragraph "a" of the Clean Streams Law of Pennsylvania (23) and with City Requirements (19). Any such specification is subject to EPA review.

REFERENCES

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15. "Time Varying Dissolved Oxygen Model - Discussion", Dr. Mamelak, J.S. and Radziul, J.V., Journal of the Sanitary Engineering Division, American Society of Civil Engineers, Vol. 95, No. SA2, April 1969.

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19. "Standard Contract Requirements for Public Works Contracts", City of Philadelphia Procurement Department, September 1971.
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24. "Rules of Practice and Procedure" - Administrative Manual, Part II - Delaware River Basin Commission, 1968.
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